

Hepatitis A Among Health Workers in Paris Hospitals

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To design a vaccination strategy against hepatitis A among hospital employees, we carried out a serological survey of hepatitis A virus (HAV) infection in 10 university hospitals in the Paris area. Subjects under 60 years of age were consecutively enrolled by occupational health services and tested for IgG to HAV by ELISA. Of the 1,516 subjects recruited, 926 were health workers (HW), 322 clerks, and 268 cooks or kitchen employees. Among HW and clerks the HAV seroprevalence was 53.8% (95% CI: 44.0–65.6), increasing with age and being higher among employees of African or Caribbean origin than those from Europe (83.6% vs 45.6%, $P < .001$). Age correlated closely with the duration of hospital work, so only age was taken into account for further analysis. The HAV seroprevalences among HW and clerks originating from Europe were close (46.8% vs 42.6%) and remained so after adjustment for age. HAV seroprevalences in HW caring for adults and those caring for children were also similar (45.2% vs 40.1%). Seroprevalence was higher in assistant nurses than in nurses (51.3% vs. 39.8%, $P < .02$). Among cooks and kitchen employees, 53.4% were HAV-seropositive. This study shows that hospital employees need not routinely be vaccinated against HAV; the decision should be taken by the occupational physician according to the type of work, but should be routine for cooks and kitchen employees. The need for prevaccinal screening for anti-HAV should be assessed in the light of employees' geographical origin and age. *J. Med. Virol.* 58:321–324, 1999.

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INTRODUCTION

Until the 1980s prophylaxis against hepatitis A virus (HAV) infection among health workers consisted only of strict orofecal hygiene rules. These rules are still of prime importance, but, with the development of a safe and efficient vaccine against hepatitis A [Andre et al., 1992], it would be of interest to know if health workers have a higher risk of HAV infection than the general population. Furthermore, for several decades, the proportion of the population at risk of HAV infection in Europe, including France [Joussemet et al., 1998], has been increasing markedly [Frosner et al., 1979] through improvements in socioeconomic conditions and hygiene and the resulting fall in the HAV seroprevalence rate.

The occurrence of nosocomial outbreaks due to HAV transmission from patients to nurses [Goodman et al., 1982; Klein et al., 1984; Skidmore et al., 1985; Drusin et al., 1987] and vice versa [Ebisawa, 1984] is well documented. Foodborne outbreaks [Meyers et al., 1975] have also been reported in the hospital setting.

Reports on the seroepidemiology of HAV infection among hospital health workers have been contradictory. Some studies suggest that health workers—particularly nurses [Windorfer et al., 1989]—are at higher risk of HAV infection than administrative staff [Germanaud et al., 1992], and others that pediatric nurses are at higher risk than nurses in other depart-

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ments [Hofman et al., 1992; Van Damme et al., 1993], but these data have not been borne out by other seroepidemiological studies [Gibas et al., 1992; Djeriri et al., 1996; Nguyen-Khac et al., 1996] or by community-based studies of risk factors associated with acute hepatitis A [Francis et al., 1984; Maguire et al., 1995].

In this study, we compared HAV seroprevalences in a large sample of health workers and clerks in Paris hospitals, taking into account possible confounding variables such as age and geographical origin. HAV seroprevalence was also measured among cooks and kitchen employees, who are potential sources of food-borne infection.

POPULATION AND METHODS

Staff below age 60 in 10 Paris university hospitals were recruited consecutively by occupational health services at their routine annual checkup. Surgical, obstetric, and laboratory staff and subjects previously vaccinated against HAV were excluded from the study. The protocol was approved by the Paris Hospitals ethics committee and subjects were enrolled only if they signed an informed consent form.

Information on demographic characteristics (age, sex, birthplace, and current residence), occupation, and the length of time as hospital worker was collected by using a standard questionnaire; health workers were considered to have cared for adults or children if they spent at least 75% of their employment time caring for one or other category.

Blood was collected in dry tubes and serum, obtained by clotting and centrifugation, was kept at -20°C until testing. Sera were tested blindly for anti-HAV IgG by using an ELISA technique (Organon Teknika).

Patient data and laboratory results were analyzed using EPIINFO 6 software (CDC, OMS). Distributions were compared using the chi-square test, P values of $<.05$ being considered significant. Means are expressed with standard errors, and prevalence rates with 95% confidence intervals.

RESULTS

The 1,516 subjects investigated included 926 health workers (mean age: 35.6 ± 8.2 ; sex ratio [M:F]: 0.24), 322 clerks (mean age: 36.4 ± 8.3 ; sex ratio: 0.12), and 268 cooks and kitchen employees (mean age: 33.7 ± 8.9 , sex ratio: 1.15). Subjects from Africa and the Caribbean were underrepresented among clerks (24.9% vs 11.8% among health workers).

Nurses (45.4% of the total sample) and assistant nurses (42.0%) were the commonest categories of health workers; 367 of the 926 health workers (39.6%) had cared for adults for more than 75% of their past activity, 343 (37.0%) for children, and (23.4%, 216/926) for both. The length of time spent working as a health worker correlated closely with age ($r = .86$, $P < .001$), so only age was taken into account in further analyses.

TABLE I. Hepatitis A Virus Seroprevalence According to Occupation and Geographic Origin

	Health workers		Clerks		Cooks	
	<i>n</i>	%+	<i>n</i>	%+	<i>n</i>	%+
Europe	695	46.8	284	42.6	199	41.7
Africa/Caribbean islands	231	85.3	38	73.7	69	87.0
<i>Total</i>	926	56.4	322	46.3	268	53.4

Seroprevalence of HAV in the Overall Population

Data for the 1,248 health workers and clerks were analyzed after excluding cooks and kitchen employees. The overall HAV seroprevalence was 53.8% (44.0–65.6) (671/1248). Seroprevalences were similar in men (55.6%, 119/214) and women (53.4%, 552/1034) but were much higher in subjects from Africa and the Caribbean (83.6%, 225/269) than in Europeans (45.6%, 446/979, $P < .001$).

The seroprevalence increased with age from 29.8% (133/446) in the under-30 age group to 77.3% (385/498) in subjects over 39 (chi-square for trend: $P < 10^{-6}$). As shown in Table I, the overall prevalence rate of anti-HAV was higher among health workers (56.4%, 522/926) than in clerks (46.3%, 149/322) ($P < .01$).

Seroprevalence of HAV in Hospital Workers From Europe

As compared with health workers, employees from African and Caribbean countries were poorly represented among clerks (11.8% vs 25.0%). Therefore, the comparison between health workers and clerks was restricted to subjects from Europe; the HAV seroprevalences in the latter two groups were close (46.8% [45.8–56.6], 325/695 for health workers versus 42.6% [32.9–52.3], 121/284 for clerks). The mean age of health workers was higher than that of clerks (34.7 ± 8.3 versus 36.0 ± 8.3 , $P < .05$). After adjustment for age, the difference in HAV seroprevalence between the two groups remained non significant.

Figure 1 shows the distribution of anti-HAV antibody according to age, occupation (health workers vs clerks), and geographical origin (restricted, as above, in the case of clerks, to subjects from Europe). Figure 1 illustrates the close relationship between HAV seropositivity on the one hand and age and geographical origin on the other hand. Within each age group, no significant differences in HAV seroprevalences were found between European health workers and clerks.

HAV seroprevalences in European health workers who had cared for adults and children were 45.2% (113/250) and 40.1% (112/279), respectively, and the mean ages of these two categories were also very similar (34.8 ± 8.4 and 34.4 ± 7.9 , respectively). When non-European subjects were considered, no difference in HAV seroprevalence was observed between the two above categories (84.5% [71/84] vs 85.5% [118/138]). In each category, the mean ages of non-European subjects were similar (38.8 ± 7.9 vs. 37.9 ± 7.9).

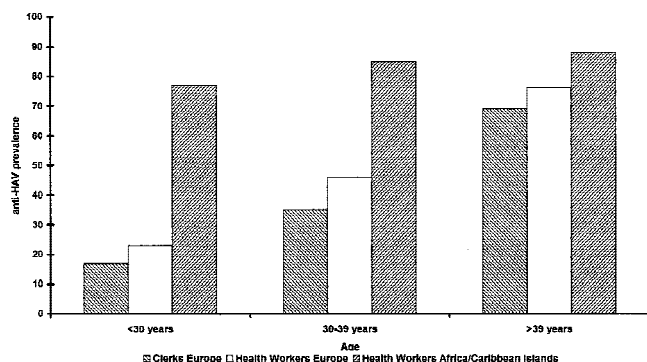


Fig. 1. Prevalence of anti-HAV according to age, origin, and occupation.

Among health workers from Europe, the HAV seroprevalence in assistant nurses (51.3%, 101/197) was higher than in nurses (39.8%, 139/349, $P < .02$). The ages of these two categories were similar (34.5 ± 8.3 vs. 33.7 ± 7.6). This difference between assistant nurses versus nurses was observed as even when the analysis was restricted to personnels with less or more than 5 years of service, respectively. Among health workers from southern areas, however, no significant differences were observed between assistant nurses and nurses in these respects (seroprevalences 78.2% [43/55] and 87.3% [145/166] and ages 37.6 ± 8.8 and 39.0 ± 7.5 , respectively).

Seroprevalence of HAV Among Cooks and Kitchen Employees

Among cooks and kitchen employees, 53.4% (44.6–63.6) (143/268) were seropositive for HAV, seroprevalence being associated with geographical origin (Europe: 41.7%, Africa/Caribbean: 87.0%) and increasing with age.

DISCUSSION

This study shows that, among the hospital employees investigated, health workers are not at a higher risk of HAV infection than clerks, but that HAV seroprevalence is higher in assistant nurses than in nurses. A large percentage of health workers and cooks are not naturally immunized against HAV. The two main variables associated with HAV infection are age and geographical origin.

Even though the hospital workers we investigated were not randomly selected, recruitment of the study population consecutively at their routine annual health visit was unlikely to have introduced a significant bias as far as exposure to HAV infection is concerned.

The IgG anti-HAV antibody we screened for in this study is long-lasting, meaning that we were measuring age-related cumulative HAV seroprevalence. As age and geographical origin have a major effect on HAV seroprevalence, these variables were taken into account in our analysis. The fact that subjects from Africa and the Caribbean had higher HAV seroprevalences than Europeans agrees with studies published since

the 1970s showing the higher risk of the infection in countries where sanitation is inadequate [Dienstag et al., 1978]. These differences between developing and industrialized countries are even more pronounced now that exposure to HAV is decreasing markedly in industrialized countries, including France [Joussemet et al., 1998], owing to improved orofecal hygiene. Therefore, the proportion of the French population at risk of HAV infection is increasing. Studies are thus required to identify populations possibly more exposed to HAV infection (including health workers), with a view to designing vaccination strategies. The profile of HAV seroprevalence according to age among the hospital workers we investigated might be determined both by the age effect and a cohort effect, the youngest subjects having been at a lower risk of infection than those older.

There are two possible causes for the higher HAV seroprevalence in assistant nurses than in nurses in our study. Higher fecal exposure to HAV from contact with patients cannot be excluded, but differences in socioeconomic status, a variable known to be associated with HAV infection [Dienstag et al., 1978] being another possible explanation. This last explanation is more likely as this higher HAV seroprevalence in assistant nurses was still observed when the comparison with nurses was restricted to persons with less than 5 years of service (therefore, with limited professional exposure to HAV). The socioeconomic level would have been difficult to evaluate during routine occupational medicine visits, so we cannot reach a conclusion on this point.

Some studies have suggested that health workers in pediatric units are at a higher risk of HAV infection through frequent exposure to feces potentially bearing HAV [Hofman et al., 1992; Van Damme et al., 1993], but we did not find such a difference in our study population and have no explanation for this discrepancy.

The fact that HAV seroprevalence was no different between European health workers and clerks supports the recommendation that vaccination of health workers against HAV should not be mandatory [CDC, 1997], and our results agree with those of Djeriri et al. [1996], Gibas et al. [1992] and Nguyen-Khac et al. [1996]. In documented nosocomial outbreaks of hepatitis A, the CDC advisory committees [1997] recommend “the administration of immunoglobulins to persons who have close contact with infected patients,” stating that “the usefulness of hepatitis A vaccine in controlling outbreaks in health-care settings has not been investigated.” But the efficacy of postexposure HAV vaccination in the context of communitywide outbreaks has been clearly demonstrated [Prikazsky, 1994].

The transmission of other infections through fecal exposure, and the occurrence of nosocomial outbreaks of HAV due to orofecal transmission [Ebisawa, 1984; Klein et al., 1984; Skidmore et al., 1985; Drusin et al., 1987] underline the need for good fecal hygiene in hospitals [Sepkowitz, 1996]. This is particularly important for HAV, as the virus remains infectious for a long time

at room temperature [McCaustland et al., 1982]. These preventive measures are important not only for employees but also for their families [Drusin, 1987], given the highly contagious nature of HAV for household contacts.

Outbreaks of foodborne hepatitis in health care settings have been reported [Meyers et al., 1975]. Like all people handling food, hospital cooks and kitchen employees should observe strict orofecal hygiene measures. In our study population, 47% of such workers were not protected against HAV and, as recommended [Hofmann, 1992], they should be vaccinated. Sewage workers [Pool and Shakespeare, 1993] and cleaning personnel [Hoffman et al., 1992] have also been shown to be at an increased risk of HAV infection and should thus be vaccinated.

The value of screening subjects eligible for vaccination for existing anti-HAV antibodies providing natural protection should be considered. A simple calculation (based on a formula previously used for selecting subjects to receive standard gammaglobulin for prophylaxis of HAV infection [Larouze et al., 1984]), taking into account age-specific anti-HAV prevalences, the cost of HAV vaccination, and the cost of testing for anti-HAV antibodies shows that, in our study population, such screening would be cost-effective for European subjects above age 30 and for all subjects from outside Europe. But this cut-off age for European subjects should be regularly reassessed in coming years, taking into account the marked decrease in HAV seroprevalence among young adults, particularly in France (of the order of 10% among 18-year-old French army recruits in 1997 versus 50% 20 years ago) [Joussemet et al., 1998]. In conclusion, this study shows that the vaccination of hospital health workers against hepatitis A should not be done routinely but be decided by the occupational medicine physician according to the type of work [Communauté Européenne, 1993]. The vaccination of food handlers and sewage/cleaning employees, however, should be routine. Targeted prevaccinal screening should be part of this strategy.

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